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ABSTRACT

A substantial resource is provided for those concerned with mathematics teaching in bilingual programs. Part I provides a concise overview of the issues and problems involved in the teaching of mathematics in bilingual classrooms. It begins with a brief description of the field of bilingual education and then considers the role of mathematics teaching with respect to the language of instruction, cultural referents, and certain psychological factors. Part II consists of an annotated bibliography of materials for teaching mathematics in Spanish/English programs. A list of suppliers of bilingual mathematics materials, a list of references to general bilingual materials, and a phrase list are appended. (MP)

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MATHEMATICS EDUCATION REPORTS

RESOURCES FOR TEACHING MATHEMATICS IN BILINGUAL CLASSROOMS

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FOREWORD

Mathematics Education Reports are developed to make available information on research and development efforts of various types. We are pleased to publish this resource designed for teachers who have bilingual students. It is a first attempt to provide such information to aid teachers of mathematics. A discussion of problems and issues affecting bilingual mathematics programs is followed by an annotated list of teaching materials for mathematics instruction. Appendices list sources of materials, some selected references, and a list of essential mathematical terms and expressions in Spanish and in English.

We recognize that this is a first step: your suggestions can help the authors and us at ERIC/SMEAC to develop other materials which will be of further help to you. Priorities for the development of Mathematics Education Reports are established by the advisory board of the Center, in cooperation with the National Council of Teachers of Mathematics, the Special Interest Group for Research in Mathematics Education, and other professional groups in mathematics education. We welcome comments on previous Reports and suggestions for future Reports.

We thank Jim Lovett and Ted Snyder for making available this resource for teachers of bilingual students.

Marilyn N. Suydam
Jon L. Higgins
Editors

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Resources for Teaching Mathematics in Bilingual Classrooms

Introduction

The field of bilingual education has expanded greatly in the last ten years. With the passage of the Bilingual Education Acts of 1968 and 1974, bilingual classes may now be found in nearly every region of the country. As the field continues to expand, mathematics educators are being asked to participate at a variety of levels, from teaching and curriculum planning to teacher training and research. Interested mathematics educators soon discover, however, that while the literature of bilingual education is quite extensive, very little of it is concerned with what happens in mathematics teaching, and most of what does exist is hidden away in books and articles devoted to more general interests.

The purpose of this report is to provide, in one document, a substantial resource for those concerned with mathematics teaching in bilingual programs. The report is divided into two parts. Part I provides a concise overview of the issues and problems involved in the teaching of mathematics in bilingual classrooms. It begins with a brief description of the field of bilingual education and then considers the role of mathematics teaching with respect to the language of instruction, cultural referents, and certain psychological factors. Part II consists of an annotated bibliography of materials for teaching mathematics in Spanish/English programs. Materials were selected on the basis of their availability in Spanish or dual-language versions, or, in the case of certain English-language materials, their relevance to the cultural heritage and background of hispanic peoples in the United States.

A list of suppliers of bilingual mathematics materials, a list of references to general bilingual materials, and a phrase list are appended.

PART I

Overview of Issues and Problems

C. James Lovett

The purpose of this part is to analyze those aspects of bilingual education that are particularly relevant to the teaching of mathematics in such contexts. Since some readers may be unfamiliar with bilingual education as a field, I will begin with a brief overview, giving attention to its goals as well as the origins of its recent growth. In approximately 80 percent of the bilingual programs currently funded by the federal government, the non-English language is Spanish. The remaining programs involve an additional 40 to 50 languages. Most of the following material, however, applies across languages, and to indicate this generality I shall use "X" to represent a language other than English.

There is no universally accepted definition of bilingual education (or, for that matter, of bilingualism). The description offered below, however, represents the most prevalent view and is consistent with the orientation of the Bilingual Education Act.

First, two languages, English and X, are not only taught as languages per se, but are used as media of instruction for the various content areas. From the point of view of language teaching, this statement expresses an important position which may escape those of us primarily concerned with mathematics teaching. According to that position, language learning is much more efficient and second-language learning, in particular, is much more apt to occur when the language is actually used for communication about topics of interest and concern, as opposed simply to being taught as a separate subject. At the entry level in a typical program, non-English-speaking children are given content instruction (including mathematics) in their native language and English-as-a-second-language (ESL) instruction. When sufficient proficiency in English is attained, the children begin receiving content instruction in both languages. Depending on the program, the language used may vary either within or among content areas. This aspect will be explored in greater detail in the next section.

A second aspect of bilingual education deals with cultural background. The curriculum as a whole, but particularly the areas of language arts and social studies, is restructured to include various aspects of the cultural heritage and history of the group involved. In contrast to the assimilistic notion of the American melting pot, the goal of most professionals in bilingual education is pluralistic: to yield people who are literate in two languages, who are prepared for the demands of life in a competitive, technological society, but who are knowledgeable of and free to retain their cultural identity.[1]

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[1]See Glazer and Moynihan (1970) for an extended treatment of the assimilism/pluralism issue.

The rationale for bilingual education, and the basis for its recent growth as a field, is twofold. On the one hand, it may be viewed as an outgrowth of the general movement of various ethnic minorities towards taking greater pride in their cultural heritage. This movement was in reaction to assimilistic pressures as well as discrimination against these groups. To Gaarder (1976), "the only rationale either needed or worthy of being heeded for teaching a child through its mother tongue is the simple proposition that it is a fundamental human right for every people to rear--and educate--its children in its own image and language" (p. 54). But if the roots of bilingual education are socio-political in nature, they are also pedagogical, developing from the recognition that most schools were not meeting the needs of children whose first, or native, language is other than English. While the typical child from this group may have some knowledge of English (some may even be quite fluent), it is frequently insufficient for conversation, not to mention coping with formal schooling in English. Before recent legislation, the problem was compounded when schools forbade children, sometimes under threat of punishment, to speak their native language; they were addressed and expected to respond only in English and frequently treated as inferior or even retarded.[2] In the mid-1960s, congressional hearings on the problem indicated conclusively that in schools throughout the United States the typical result of such children was repeated failure and eventual withdrawal. These hearings led to the Bilingual Education Act which was signed into law in January 1968 as Title VII of the Elementary and Secondary Education Act. The law was later rewritten and expanded as the Bilingual Education Act of 1974. These acts of Congress established the right of every non-English-speaking child to a bilingual program of education, and provided for the support of such programs.

The goals of bilingual education tend to be controversial, and many aspects of implementation are quite complex. A full discussion of these matters here, however, would lead away from the main purpose of this report. For a detailed study of bilingual education, the reader is referred to Andersson and Boyer (1970) or the document from the United States Commission on Civil Rights (1975).

Mathematics Teaching in Bilingual Programs

How is mathematics teaching affected by placing it in the context of a bilingual program? Three aspects appear particularly important: the language of instruction, the inclusion of appropriate cultural referents, and attention to the cognitive styles of the children involved. The first two may be drawn immediately from the preceding discussion. The third is based on recent research (Laosa, 1977; Ramírez and Castañeda, 1974) which suggests that children's modes of learning may be related to their cultural background.

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[2] See Kobrick (1974) for a general description of the conditions which existed.

Language of Instruction

There are many possible patterns of language usage in a bilingual program. For our purposes, however, it will be sufficient to consider three basic patterns: teaching entirely in X, teaching entirely in English, and teaching in some mixture of X and English. The reader interested in greater detail will find an extensive typology of language usage in Mackey (1970). In addition, Engle (1975) provides a broad review of research in this area (not confined to mathematics teaching).

Teaching in X

In most bilingual programs, non-English-speaking children receive their first mathematics instruction entirely in their native language. It should be noted that while these children are usually at the elementary school level, there are non-English-speaking high school students for whom these remarks also apply. In many programs, especially those which encourage true bilingualism, children may still receive mathematics instruction in their native language from time to time even after they have mastered English. For teachers and materials, certain basic requirements are obvious. Mathematics teachers, in addition to the need for general fluency in X, must know mathematical terms and expressions and be able to use them in an appropriate and natural manner. In addition, appropriate X-language materials must be available.[3] In both instances these requirements are not easily met.

Teachers for whom X is a second language, and even many for whom X is the first language (because they may have been educated in English), find it difficult to teach mathematics in X. English/X dictionaries containing elementary and secondary school mathematical terms and expressions are of obvious importance. But, while a few are available for Spanish/English (e.g., Martínez, 1973), hardly any are to be found for other languages. Of much greater importance than dictionaries, however, is the opportunity for teachers to gain practice using X in mathematical contexts before they are expected to teach in X. Gaarder (1977), for example, suggests that teacher trainees be given

> a complete course...beginning with first-grade books and progressing as rapidly as possible through the sixth- (or higher) grade level, using Spanish-language texts and a trained Spanish-language teacher and working out all the problems and explanations aloud. It does not suffice--or even help--merely to talk about mathematics in Spanish, or give a methods course in Spanish or merely learn the Spanish terminology (p. 85).

At the present time, preservice and in-service bilingual mathematics education remains a critical problem. While there are many bilingual

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[3]The importance of this point is underscored by an EPIE Institute (1976) finding that "90% of classroom teaching/learning activity...is structured by materials" (p. 19).

teacher training programs around the country, few give special attention to the teaching of mathematics.

The situation for X-language instructional materials is also critical. To be appropriate for a bilingual program, materials should be written for use in the United States (as opposed to the use of imported materials from X-speaking countries), and they should be coordinated with the English-language materials used by the program. For Spanish, as evidenced by Part II of this report, appropriate materials are becoming available. For other languages, because of the much smaller numbers of children involved, very little progress has been made. An EPIE Institute (1976) report on materials for Asian language bilingual programs, for example, contains few materials for any subject area and virtually none for mathematics.

In the case of Native American languages, the above problems are further complicated by the fact that certain mathematical concepts [e.g., "line" (see Smith and Bitter, 1974)], have never been abstracted as separate or distinct entities of thought. Consequently, unique words to convey such concepts do not exist. Perhaps this is neither surprising nor alarming. English itself is well-stocked with "borrowed" words, and mathematics in particular is replete with examples of ordinary words whose meanings have been extended to express mathematical concepts. It does, however, present interesting and challenging questions which go well beyond the scope of mathematics education. To what extent should a language be expanded to express concepts embedded in a complex, technological world, and who should make such decisions?

Teaching in English

Superficially, we may be tempted to think that English-language mathematics instruction in a bilingual school is no different from that in a monolingual English situation. On closer inspection, however, we can see that this is not the case.

In some bilingual programs, all mathematics instruction from the earliest years onward is in English. Such instruction is necessarily slowed until children gain sufficient proficiency in English. This approach stems to some extent from a fear, expressed by Saville and Troike (1970), that children who learn basic computational skills in X will find it extremely difficult to learn more advanced mathematical concepts in English. This issue is certainly subject to further research, but there is recent evidence in the United States (Cohen, 1975; 1976) as well as from Canada (Swain and Barik, 1976) that, under appropriate conditions, children who learn mathematics in either their first or second language are not disadvantaged when they switch to the other language.

In most bilingual programs, English-language mathematics instruction begins after children have attained a designated level of English proficiency. For children who enter a program at the kindergarten

level, this usually occurs by the second or third grade. At the secondary level, the amount of time spent in X-language instruction before switching to English is quite variable, depending on the individual backgrounds of the students as well as the nature of the program. At either level, English-language mathematics classes tend to be "mixed," including X-speakers of varying backgrounds with respect to the language in which they received earlier mathematics instruction in X. In most cases, partly because of a lack of qualified bilingual teachers, monolingual teachers find themselves responsible for classes of this type. Even though instruction, by design, is in English, teachers find it helpful to acquire at least a basic knowledge of X with attention, of course, to the appropriate mathematical terms and expressions. One reason, naturally, is so that teachers do not feel totally excluded when children speak X among themselves. More important, it helps teachers to understand and respond more appropriately to the needs of children who have not acquired complete mastery of English or who, in certain instances, would prefer to explain themselves in X. There is also the important matter of attitudes. Even a minimal knowledge of X can demonstrate a teacher's respect for the children's native language. Coupled with appropriate cultural referents (discussed later), this can result in better pupil/teacher relationships as well as an improved disposition towards learning mathematics.

Teaching in X and English

There are three general patterns within this approach. The first appears to occur, partly by design and partly by circumstance, in a large number of bilingual programs. The second and third patterns, which require more planning, seem to occur much less frequently. The first pattern consists of an unstructured mixture of X and English. Teachers switch back and forth between languages as they feel intuitively that this is necessary for particular examples or for particular children. In the second pattern, children essentially receive the same lesson twice, once in X and once in English. This may be in the form of a complete lesson in one language followed, perhaps after lessons in other subjects, by the same lesson in the other language, or it may employ a type of consecutive translation by sentence or paragraph where the teacher says everything twice, once in each language. The third pattern alternates the language of instruction on a daily basis without repetition of lessons. This may employ a review/lesson/preview technique so that lessons taught in one language are previewed and reviewed in the other.

Most linguists and language teachers react in horror to the first pattern described, and, while the reaction is not as extreme, they are not especially fond of the second pattern. They fear that children will learn to mix the two languages indiscriminately or that they will simply "tune-out" their non-dominant language whenever it is used. At best, second language development may be thwarted; at worst, children will fail to learn either language well as a separate language (Andersson and Boyer, 1970). On the other hand, some linguists have

indicated that such fears may be overstated (Mackey, 1969). Specifically in the area of mathematics teaching, there is some evidence that the second pattern, at least, can be effective in terms of mathematics achievement without damage to the learning of either language (Treviño, 1968). Similarly, positive results have been found for the alternate-day pattern (Cohen, 1975).

In any of the above patterns, the demands on teachers in terms of general fluency in X and English, especially in the area of mathematics, are great. In addition, these patterns require either parallel sets of instructional materials in each language or dual-language materials. As can be seen in Part II of this report, some materials of these types are available for Spanish/English. For other X/English combinations, however, such materials are practically nonexistent.

Cultural Referents

"Culture" means different things to different people. In this report, the term is used to mean the collection of social traditions, habits, and values which are reasonably identifiable as shared by some group of people. This includes child-rearing and socialization practices, interpersonal relationships within the family as well as the larger community, and such things as tastes in food, clothing, music, and so on.

In the above sense, mathematics is certainly a culture-free discipline. But the teaching of mathematics, especially at the elementary school level, takes place in a cultural context. Good mathematics teachers have always been sensitive to the real-world experiences of their pupils. Such teachers search constantly for the mathematics existing within these experiences, as well as for ways to exploit these experiences by superimposing mathematical tasks on them. In bilingual classrooms, this aspect is accentuated. Some obvious points for consideration here include reference to appropriate holidays, festivals, and other social customs; typical foods and clothing; and names (in story problems) typical of the children in the cultural group involved.

Here is an example. Many Puerto Ricans in New York are accustomed to making regular visits to the island of Puerto Rico. This is so much a part of the culture of this urban group that many Puerto Rican children have had the experience of making the flight several times by the age of 9 or 10. One Brooklyn elementary school teacher capitalized on this by making a board game for arithmetic skill practice. The object of the game was to "travel," by solving various computational problems on the game board, from New York to Puerto Rico. This simple twist of an old idea now reflects something more familiar to the children. Consider things of this type multiplied many times and the result is a culture-based approach to mathematics teaching.

The above example was concerned with a unique situation and, as such, it serves to highlight this next point. It is not possible to give general examples that will be appropriate for all bilingual classrooms, even within the same language group. The example cited is clearly inappropriate for Mexican-American children in Los Angeles, and examples appropriate for that group may well be inappropriate for Mexican-Americans in rural New Mexico. Consideration of the cases for Navajo children in Arizona, Portuguese children in the Boston area, Chinese children in San Francisco, and Cuban children in Miami adds greater emphasis to this point. The resulting implication is clear. Teachers must look to their own unique situations to find appropriate real-world, cultural referents for teaching mathematics.

Cognitive Styles

The language of instruction and curricular integration of children's cultural background are obvious points for consideration in teaching mathematics in bilingual classrooms. Ramírez and Castañeda (1974) and Laosa (1977), however, have taken the position that children's cognitive styles must also be considered. The concept of cognitive style refers to the general manner or way in which a person thinks as opposed to the person's intelligence or ability. Different styles represent consistent differences in ways of organizing and processing information and experience. In the words of Messick (1976),

> they are conceptualized as stable attitudes, preferences, or habitual strategies determining a person's typical modes of perceiving, remembering, thinking, and problem solving. As such, their influence extends to almost all human activities that implicate cognition, including social and interpersonal functioning (p. 5).

Thus, cognitive styles are quite different from abilities. The idea of ability suggests capacity in terms of a maximum level of performance in given content areas. Cognitive style, on the other hand, suggests modes of operation across abilities.

Many different cognitive style dimensions have been developed over the years (see Messick, 1976). The most widely studied, and the one of interest here, is the field-independence/field-dependence dimension developed by Witkin et al. (1962; 1977). Ramírez and Castañada (1974) found that children from certain cultural groups, probably because of traditional child-rearing and socialization practices, have a much greater tendency to be field-dependent than is the case for children from the "mainstream, middleclass" culture of the United States.[4]

People who tend to be field-independent view life, both visually and intellectually, in an articulated manner. Things appear as separated into distinct parts which are related or tied together in some

[4] Ramírez and Castañeda (1974) concentrated their attention mainly on Mexican-Americans, but their argument is quite plausible for many other groups as well.

type of structure, even when no inherent structure exists in the object of interest. Field-dependent people, on the other hand, view things as global or unified in nature. They accept whatever obvious or inherent structure which may exist, but do not impose structures of their own. The field-independence/dependence dimension is continuous in nature. In other words, "there is no implication that there are two distinct types of human beings; rather, a person's place along the dimension indicates his or her degree of field dependence or independence" (Laosa, 1977, p. 27).

Many aspects of cognitive styles have been explored, and many distinguishing characteristics of relatively field-dependent and independent people have been tentatively established. The interested reader should consult Witkin et al. (1977) for a detailed review of this area. In my opinion, three aspects--structure/guidance, social content and human relations--appear particularly relevant to teaching mathematics in bilingual classrooms.

Field-independent and dependent children, as suggested above, tend to differ in their approach to the structural characteristics of a situation. Field-dependent children may learn mathematics more readily in relatively structured situations with a high degree of teacher guidance. These are approaches where end outcomes are clearly specified and explicit directions are given as to how they may be attained. Field-independent children, while able to learn in this type of situation, may learn mathematics just as readily (and perhaps even more so) in relatively unstructured, low-guidance situations. In view of the emphasis in recent years on open-ended discovery or inquiry approaches in teaching mathematics, it may be that field-independent children have been favored at the expense of those who are field-dependent. More specifically, if the thesis of Ramírez and Castañeda is correct, many children from cultural minorities have been placed at a particular disadvantage.

People who differ in cognitive style also appear to differ in their view of the social content of a situation. In particular, field-dependent children seem to have an outlook which favors the learning of materials with a relatively high degree of social content (material involving people and relationships between people). The outlook of field-independent individuals, on the other hand, tends to favor the learning of materials which can be characterized as impersonal and which require analytic as opposed to social skills. It would appear that field-dependent children, and consequently many children from cultural minorities, may be less oriented towards the learning of mathematics than is the case for field-independent children. The implication for teachers in bilingual classrooms is not unrelated to the comments made in the previous section on cultural referents, and is an extension of what many teachers have been doing intuitively for years. Particular efforts should be made to present mathematics in a personalized fashion related to the everyday activities in which children engage with their friends, family, and others in the community.

In the area of human relations, the characteristic of importance for our purposes has to do with children's preferences for working alone or with others. Field-dependent children generally prefer working in a cooperative, noncompetitive relationship with others to accomplish various tasks. Field-independent children, in contrast, tend to be more competitive and prefer working independently. To the extent that children's preferences for one style or the other actually affect their ultimate learning, this difference should be carefully considered, particularly in view of the recent emphasis on individualized learning. Frequently, individualized instruction is structured in such a way that children must work alone using worksheets, task cards, or similar materials with little or no interaction with other children. The keeping of posted progress charts, prevalent in some classrooms regardless of the intent of program designers, adds an element of competition. In their sincere efforts to promote better mathematics learning, proponents of some individualized instruction approaches may have inadvertently encouraged situations with the opposite result for many children.[5]

In all three aspects discussed above, the reader has probably noted that both directions of the field-dependence/independence dimension of cognitive style have characteristics of importance. While children should learn how, for example, to attack nonroutine, open-ended problem situations, they also need to be able to learn by means of highly structured approaches: this is the most efficient way, in many instances, of acquiring needed knowledge and information. Likewise, children should be able to learn material with social content as well as impersonal material requiring more analytic skills. And, of course, children should be able to work independently as well as with others. Ramírez and Castañeda (1974) use the term "bicognitive" to describe the facility to switch back and forth between approaches or strategies characterizing field-dependent or independent styles depending on the most appropriate approach or strategy for the task at hand. Bilingual classrooms, they suggest, can help children become bicognitive as well as bilingual and bicultural.

For mathematics teachers in bilingual classrooms, the main implication from the standpoint of cognitive styles is the need for a high level of sensitivity to children and how they respond to mathematics per se, as well as to different approaches to teaching mathematics. Most teachers will have neither specific test data to indicate their pupil's cognitive styles nor the time to administer and evaluate such tests. Furthermore, there is a high degree of variability within cultural groups and, in addition, most bilingual programs exist in a complex environment of overlapping cultures. Thus, even assuming the general validity of a relationship between cognitive style and cultural background, the cognitive styles of individual children

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[5] Perhaps it should be emphasized that these remarks do not apply to <u>all</u> such programs and/or approaches. Romberg's (1977) description of appropriate implementation of IGE, for example, seems to give very adequate consideration to variances in cognitive style.

should not be assumed on the basis of ethnic/cultural background. Teachers sensitized to possible differences, however, can by means of systematic observation of the results of various instructional approaches for different children, gain considerable information about their preferred styles. For example, instead of noting only whether the class as a whole functions better when individual, small-group, or whole-class modes of instruction are employed, the effect for individual children should also be observed. As children's preferred learning styles are discovered, teachers can orient their approaches accordingly. In addition, they will be better equipped to help children see that approaches other than their preferred style may be more effective for given tasks and situations.

Conclusion

There are many unanswered questions in the field of bilingual education as a whole as well as questions concerning its relationship with the teaching of mathematics. We do not know the precise role of language in the learning of mathematics (Aiken, 1972), much less the full effect of learning in two languages. Is there a tendency for meanings to become confused? Or, does learning mathematical concepts in two languages help free the concepts from dependence on either language, hence enhancing understanding? Finding appropriate cultural referents and employing them in meaningful ways for the teaching of mathematics is a challenge for the best of teachers. In addition, researchers in mathematics education have only begun to investigate the interaction of cognitive styles with different modes of instruction, and the further interaction with cultural/linguistic background is virtually unstudied. For all mathematics educators--teachers, curriculum planners, teacher trainers, and researchers (even those who are currently monolingual)--bilingual education offers a wealth of tasks that are as interesting as they are challenging and urgent.

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PART II

Annotated Bibliography of Materials

Ted Snyder

This bibliography represents an attempt to list a collection of mathematics instructional materials which are suitable for use in a bilingual classroom. The set of materials chosen is cross-referenced to a list of current sources from which these materials may be obtained.

The bibliography focuses on materials which are published in Spanish only, in both English and Spanish editions, in a bilingual-English/Spanish format, and in English with a multicultural emphasis. Because the amount of suitable English-language mathematics material available is so sizable, no attempt has been made to include any of these kinds of materials in the bibliography.

The materials are listed alphabetically by title, and the information given about each item includes the title, author(s), publisher, date of publication, source number, cost, language, publisher's designated grade level, type of material, and annotation. To find out where the material is currently available, look up the source number in the list of sources. This list of publishers and distributors contains the source's name, address, phone number (if available), and the name of a particular person to contact (if available).

MATERIALS NUMBER 1

TITLE:	Adventures With Arithmetic (Series of 4 books)
AUTHOR:	Swienciki, Lawrence N.
PUBLISHER:	Creative Publications, Inc.
DATE:	1974
SOURCE NUMBER:	10
COST (PARTICULAR SOURCE):	$4.25 each book or $14.50 for series (10)
LANGUAGE:	English (Multicultural)
PUBLISHER'S DESIGNATED GRADE LEVEL:	7 - 10
TYPE OF MATERIAL:	Story puzzles (Decoding)
ANNOTATION:	The four paperbound books cover fractions, decimals, percent, and algebra. Each book contains two story puzzles which require the student to do the problems, find the numerical answers, match an alphabetic letter to each numerical answer, and then use those letters to decode a story message. The content of these story messages is of a multicultural nature.

MATERIALS NUMBER 2

TITLE:	Algebra
AUTHOR:	Baldor, Aurelio
PUBLISHER:	Cultural Centroamericana, S. A.
DATE:	1977
SOURCE NUMBERS:	16, 24
COST (PARTICULAR SOURCE):	$8.50 (16)
LANGUAGE:	Spanish
PUBLISHER'S DESIGNATED GRADE LEVEL:	None designated
TYPE OF MATERIAL:	Comprehensive first-year algebra text
ANNOTATION:	This is an extremely comprehensive text of first-year algebra which includes several more advanced topics from second-year algebra. There are many exercises for the student in each section. Several illustrations in color are included. This text, along with several others written by Dr. Baldor, are widely used throughout Central and South America and are rather well-known.

MATERIALS NUMBER 3

TITLE:	Algebra Moderna, Estructura y Método
AUTHORS:	Dolciani, Mary P.; Berman, Simon L.; Freilich, Julius
PUBLISHER:	Publicaciones Cultural, S. A. México/Houghton Mifflin
DATE:	1967
SOURCE NUMBERS:	13, 15, 16, 24
COST (PARTICULAR SOURCE):	None designated
LANGUAGE:	Spanish
PUBLISHER'S DESIGNATED GRADE LEVEL:	8 - 12
TYPE OF MATERIAL:	Comprehensive first-year algebra text
ANNOTATION:	This is the Spanish adaptation of Houghton Mifflin's well-known text, Modern Algebra, Structure and Method, by the same authors. The English version became widely known as the "Red Dolciani Algebra Book." The text thoroughly covers the wide range of topics normally included in a standard junior or senior high school course in first-year algebra.

MATERIALS NUMBER 4

TITLE:	Algebra Moderna y Trigonometría, Estructura y Método, Libro II
AUTHORS:	Dolciani, Mary P.; Berman, Simon L.; Wooton, William
PUBLISHER:	Publicaciones Cultural, S. A., México, D.F.
DATE:	1974
SOURCE NUMBER:	24
COST (PARTICULAR SOURCE):	$8.50 (24)
LANGUAGE:	Spanish
PUBLISHER'S DESIGNATED GRADE LEVEL:	None designated
TYPE OF MATERIAL:	Comprehensive, second-year algebra text with trigonometry
ANNOTATION:	This is the Spanish adaptation of Houghton Mifflin's well-known text, Modern Algebra and Trigonometry, Structure and Method, by the same authors. (It was the third book of the series from Houghton Mifflin which included Modern Algebra, Structure and Method and Modern Geometry, Structure and Method as the first and second books.) It thoroughly covers the traditional set of topics normally included in a standard high school course in second-year algebra and trigonometry.

MATERIALS NUMBER 5

TITLE:	Aritmética: Teorico-Práctica
AUTHOR:	Baldor, Aurelio
PUBLISHER:	Cultural Centroamericana, S. A., Guatemala
DATE:	1975
SOURCE NUMBERS:	16, 24
COST (PARTICULAR SOURCE):	$8.50 (16)
LANGUAGE:	Spanish
PUBLISHER'S DESIGNATED GRADE LEVEL:	None designated
TYPE OF MATERIAL:	Comprehensive arithmetic textbook
ANNOTATION:	This is an extremely comprehensive text of arithmetic topics ranging from the most basic to the most advanced types. It covers topics that would normally be taught in a pre-algebra or first-year algebra class. There are several solved examples in each section, followed by a wealth of exercises for each topic. There are several illustrations in color. This text, along with others authored by Dr. Baldor, are extensively used throughout the Spanish-speaking world.

MATERIALS NUMBER 6

TITLE:	Contemporary Math Shade-Ins
AUTHOR:	Bureloff, Morris
PUBLISHER:	Prentice-Hall Learning Systems, Inc.
DATE:	1974
SOURCE NUMBERS:	5, 26
COST (PARTICULAR SOURCE):	$5.50 (26)
LANGUAGE:	English (Multicultural)
PUBLISHER'S DESIGNATED GRADE LEVEL:	3 - 9
TYPE OF MATERIAL:	Shade-in puzzles
ANNOTATION:	This paperbound puzzle book is an extremely useful and highly motivating tool to be used to supplement classroom instruction. The mathematics topics covered include divisibility rules, sets of factors of a given number, sets of common factors, greatest common factors, multiples, common multiples, least common multiples, prime numbers, prime decomposition, and equivalent fractions. After the exercise of shading in the puzzle according to the given rule, the student will be able to make visual recognition of a captioned illustration. Some of the results would be "Viva La Raza"; "Paz, Peace"; "Aztec Eaglet"; "Pancho Villa"; "Kung Fu"; "El Barrio Primero"; "Carnalismo"; and "Right-On".

MATERIALS NUMBER 7

TITLE:	Cuadernos Gader (Aritmética y Geometría)
AUTHOR:	Rincon, Valentin
PUBLISHER:	Enrique Sáinz, Editores, S. A., México
DATE:	1978
SOURCE NUMBERS:	15, 16, 24
COST (PARTICULAR SOURCE):	$2.95 each (16)
LANGUAGE:	Spanish
PUBLISHER'S DESIGNATED GRADE LEVEL:	1 - 6 (México)
TYPE OF MATERIAL:	Basic arithmetic worktexts
ANNOTATION:	This set of six paperbound worktexts is used in México in their grades 1-6. The texts cover a large variety of mathematical topics, and each topic has a sufficient quantity of practice exercises. Instructions are clear and concise, and each worksheet is arranged well. Some illustrations are in color.

MATERIALS NUMBER 8

TITLE:	CDA Mathematics Program
AUTHOR:	Wirtz, Robert W.
PUBLISHER:	Curriculum Development Associates, Inc.
DATE:	1974
SOURCE NUMBER:	11
COST (PARTICULAR SOURCE):	Items too numerous to list
LANGUAGE:	Bilingual-English/Spanish
PUBLISHER'S DESIGNATED GRADE LEVEL:	1 - 9
TYPE OF MATERIAL:	Basal mathematics program, grades 1-6; supplementary material for grades 7-9
ANNOTATION:	In this comprehensive, basal mathematics program, the students work with manipulative materials, sketches, and numbers as they solve problems. Concepts are introduced using manipulatives. The students are asked to do specific problems and to pursue solutions to mathematics problems they have created. All instructions to the student are given in both Spanish and English. There are kits available for involving parents in the mathematics education of their children. Instructions for the teacher are comprehensive throughout the materials. The system contains individualized computation workbooks, student record books, special mathematics problem-solving workbooks and worksheets, an implementation guide for teachers and leaders, an audio cassette support package, and placement activities and tests.

MATERIALS NUMBER 9

TITLE:	DMP - Developing Mathematical Processes
AUTHORS:	By Committee
PUBLISHER:	Rand McNally and Company
DATE:	1976
SOURCE NUMBER:	27
COST (PARTICULAR SOURCE):	Items too numerous to list
LANGUAGE:	Spanish (Grade levels K, 1, 2) English (Grade levels K-6)
PUBLISHER'S DESIGNATED GRADE LEVEL:	K - 6
TYPE OF MATERIAL:	Basal mathematics program
ANNOTATION:	This extremely comprehensive, basal mathematics program emphasizes manipulatives and other special materials to facilitate and enhance the teaching of mathematics. The students use a measurement approach to solve problems with stress on how to collect data, how to find solutions, and how to validate answers. There are 90 sequential topics developed in the program for grades K-6. For each grade level, the complete package includes physical materials kits, a printed materials kit, a teacher materials kit, a student materials kit, and a student guide kit. Rand McNally has adapted only levels K-2 into Spanish.

MATERIALS NUMBER 10

TITLE:	Divercicios Matemáticos (Repaso De Matemáticas Básicas) (8 books)
AUTHORS:	Seltzer, Carl; Cech, Joseph P.; Karl, Mary Kay; Zimmerman, Inés; Zimmerman, Robert
PUBLISHER:	National Textbook Company
DATE:	1978
SOURCE NUMBER:	22
COST (PARTICULAR SOURCE):	$9.00 each
LANGUAGE:	Spanish
PUBLISHER'S DESIGNATED GRADE LEVEL:	1 - 8
TYPE OF MATERIAL:	Mathematics puzzles and activities in duplicating master booklets
ANNOTATION:	This set of eight paperbound duplicating puzzle books in Spanish is an adaptation of National Textbook's well-known Drillsville series. These books contain several different kinds of activities on basic mathematical topics. Each book also contains a listing of the objectives covered and a correlation between those objectives and the activities. Each puzzle has a clear format and the instructions are concise. Complete instructions for the teacher are included. There are about 32 puzzles in each book.

MATERIALS NUMBER 11

TITLE:	Esta Es Su Vida (This Is Your Life)
AUTHORS:	Amelang, Susan; Hoover, Edwin (main authors). Ballard, Daniel; Lampe, Stewart; Snyder, Ted (contributing authors). Lindsay, Elaine (editor/ project director).
PUBLISHER:	Pacoima Junior High School Mathematics Demonstration Center Program, Los Angeles Unified School District
DATE:	1977 (English, revised edition) 1979 (Spanish adaptation of pupil worksheets)
SOURCE NUMBER:	23
COST (PARTICULAR SOURCE):	None designated
LANGUAGE:	English and Spanish versions
PUBLISHER'S DESIGNATED GRADE LEVEL:	9 - 12
TYPE OF MATERIAL:	A mathematics-based, survival skills, consumer education, and career curriculum simulation
ANNOTATION:	This packet of material comes in a three-hole punched version ready to be placed into a binder. The Spanish adaptation includes most of the pupil worksheets in the English version. The program is a one-year course of study with a suggested chronology of topic development. The simulation is based on what the non-college-bound student's life might be like at age 18. The student has just graduated from high school and has no definite ideas about what to do next in his or her life. The ensuing curriculum has been constructed around the typical situations these students might encounter: figuring what their paychecks will be (complete with deductions), buying the things they want, keeping records of the money they spend, shopping in catalogs or ads, furnishing their own rooms, buying a car, planning a vacation, and even moving into an apartment of their own. The entire program is designed to be taught concurrently with an individualized basic mathematics skills program.

MATERIALS NUMBER 12

TITLE:	Geometría Moderna, Estructura y Método
AUTHORS:	Jurgensen, Ray C.; Donnelly, Alfred J.; Dolciani, Mary P.
PUBLISHER:	Publicaciones Cultural, S. A., México/Houghton Mifflin
DATE:	1968
SOURCE NUMBERS:	13, 15, 16, 24
COST (PARTICULAR SOURCE):	Text $11.20 (16) Workbook $4.30 (16)
LANGUAGE:	Spanish
PUBLISHER'S DESIGNATED GRADE LEVEL:	10 - 12
TYPE OF MATERIAL:	Comprehensive high school plane geometry text
ANNOTATION:	This text is the Spanish adaptation of Houghton Mifflin's well-known text Modern Geometry, Structure and Method by the same authors. It thoroughly covers the wide range of topics normally included in a standard high school course in plane geometry. A programmed practice workbook based on the text is also available in Spanish.

MATERIALS NUMBER 13

TITLE:	Introducción a la Geometría
AUTHORS:	Bassler, Otto C.; Curry, Richard D.; Hall, Wayne H.; Mealy, Edward C.
PUBLISHER:	Charles E. Merrill Publishing Co.
DATE:	1974
SOURCE NUMBER:	21
COST (PARTICULAR SOURCE):	Complete Package $150.00 (21) Workbooks (10 copies) $ 45.00 (21) 10 ruler-protractors + 10 grids $ 9.00 (21) Answer key $ 1.50 (21)
LANGUAGE:	Spanish
PUBLISHER'S DESIGNATED GRADE LEVEL:	6 - 9
TYPE OF MATERIAL:	Basic geometric concepts workbooks and audiotape support system. Complete package contains 10 workbooks, cassette album containing 10 tapes, 10 ruler-protractors, 10 grids, and an answer key.
ANNOTATION:	This material is the Spanish adaptation of Merrill's Introductory Geometry package. The package is a combination of taped instruction (cassettes in Spanish) and student workbooks which encourages students to learn basic geometric concepts by drawing and manipulating geometric figures. The format is clear and the instructions are concise.

MATERIALS NUMBER 14

TITLE:	Key to Algebra (1-4); Clave para el Algebra (1-4)
AUTHOR:	Rasmussen, Peter
PUBLISHER:	Key Curriculum Project
DATE:	1971
SOURCE NUMBER:	18
COST (PARTICULAR SOURCE):	Same for English and Spanish editions: Set of booklets 1-4 $2.20 Answer book $1.00 Notes for the teacher (18) $0.30
LANGUAGE:	Spanish English
PUBLISHER'S DESIGNATED GRADE LEVEL:	None designated
TYPE OF MATERIAL:	Four paperbound worktext booklets on introductory algebra
ANNOTATION:	This set of four worktext booklets contains introductory material on many of the major topic areas of first-year algebra. The explanations are presented in a manner which encourages independent work on the part of the student. A wealth of exercises are provided to deepen each student's understanding of the concepts covered in the material. This material was originally used to introduce algebra to general mathematics students. The Spanish edition corresponds page-by-page with the English edition.

MATERIALS NUMBER 15

TITLE:	Las Matemáticas: Lenguaje Universal (Aguila Volante Series)
AUTHOR:	None indicated
PUBLISHER:	National Dissemination and Assessment Center for Bilingual Education, Austin, Texas
DATE:	1978
SOURCE NUMBER:	12
COST (PARTICULAR SOURCE):	Teacher Guide I + student texts levels 1, 2a, 2b, 2c, and 3, $20.00, the set
LANGUAGE:	Bilingual-English/Spanish
PUBLISHER'S DESIGNATED GRADE LEVEL:	6 - 8
TYPE OF MATERIAL:	Set of 11 paperbound textbooks and 2 teacher guides covering basic mathematics topics
ANNOTATION:	This is the first comprehensive set of secondary bilingual mathematics materials to be conceived, constructed, pilot-tested, field-tested, and published by the Fort Worth Schools, the Bilingual Materials Development Center, and the National Dissemination and Assessment Center for Bilingual Education in Texas. The set of topics covered is broad enough so that the series could be used as a self-contained curriculum. It could also be used as a supplement to another basal program, for individualized instruction, and in small- or large-group instruction. The first five books and Teacher's Guide I are now available. Publication of the last six books with accompanying teacher's guide is expected in 1979.

MATERIALS NUMBER 16

TITLE:	Las Skilltapes De Matemáticas De Merrill (Merrill Mathematics Skilltapes)
AUTHOR:	Sganga, Francis T.
PUBLISHER:	Charles E. Merrill Publishing Co.
DATE:	1972
SOURCE NUMBER:	21
COST (PARTICULAR SOURCE):	Complete Set - 40 Cassettes 10 each of the 9 Student Booklets 1 Teacher Guide $396.00 (21)
LANGUAGE:	Spanish English
PUBLISHER'S DESIGNATED GRADE LEVEL:	3 - 9
TYPE OF MATERIAL:	Complete set of cassettes, student booklets, and a teacher guide on basic mathematics skills
ANNOTATION:	This set of supplementary classroom materials is the Spanish adaptation of the Merrill Mathematics Skilltapes. It can be described as a diagnostic, prescriptive, and instructional multi-media program. Both Spanish and English editions contain student workbooks to be used with each cassette in the package. Many different applications of mathematics to real life are included. Self tests at the end of each booklet help students evaluate their own progress. A teacher's guide is included in the complete program.

MATERIALS NUMBER 17

TITLE:	Los Angeles Mathematics Program (LAMP)
AUTHORS:	By Committee
PUBLISHER:	Los Angeles Unified School District - District Publication
DATE:	1977
SOURCE NUMBER:	19
COST (PARTICULAR SOURCE):	Items too numerous to list
LANGUAGE:	Bilingual - English/Spanish
PUBLISHER'S DESIGNATED GRADE LEVEL:	K - 8
TYPE OF MATERIAL:	Complete classroom mathematics management system
ANNOTATION:	This program has been developed by teachers in the Los Angeles Unified School District, and is being implemented in many schools throughout the District. The program is a classroom management and resource system (utilizing computer assistance, if desired) to enable teachers to provide students with an individualized learning program in mathematics. Guide I contains the philosophy of the program, implementation, guidelines and suggestions, and the formal statement of objectives. Guide II contains complete prescriptions for all objectives. Guide III contains the pupil activity supplementary worksheets which can be used with individuals, small groups, or large groups, and task cards and game sheets for most objectives. All pupil activity worksheets in this guide have bilingual instructions. Even if a computer is not available to assist, there are many parts of this program which could be used by any teacher in any kind of program to help individualize instruction. All ability levels in both reading and mathematics have been provided for in the program. In addition, Guide II contains an extremely valuable set of annotations. All the teaching objectives and activities in the LAMP have been cross-referenced to current textbook series, including Addison-Wesley,

Curriculum Development Associates (CDA), Holt, Houghton Mifflin, Scott Foresman, and Silver Burdett. Also included in this program are materials for pre- and posttesting all objectives, individual student profile cards, and class profile sheets.

MATERIALS NUMBER 18

TITLE:	MAS (Mathematics Achievement System)
AUTHORS:	Archerd, Robert; Schroeder, John
PUBLISHER:	MAS
DATE:	1978
SOURCE NUMBER:	20
COST (PARTICULAR SOURCE):	Items too numerous to list
LANGUAGE:	Spanish English
PUBLISHER'S DESIGNATED: GRADE LEVEL:	1 - 6
TYPE OF MATERIAL:	Set of single instructional objective worksheets covering a wide spectrum of basic mathematics skills (supplemental material)
ANNOTATION:	This series of mathematics worksheets covers the following broad topic areas: numeration, addition, subtraction, multiplication, division, fractions, decimals, and geometry/measurement. As support material, MAS offers three levels of primary testing, five levels of upper grade testing, answer keys, pupil profiles, class profiles (primary and upper grade), and teachers' manuals. Each worksheet contains a variety of different activities centered around a single mathematics skill. This format makes the series extremely useful for reviewing or reteaching certain mathematics concepts which were not fully mastered after the initial teaching presentation. The Spanish and English editions are identical in format. There is some illustration in the form of cartoons on each worksheet. The worksheets are consumable.

MATERIALS NUMBER 19

TITLE:	Matemática De Silver Burdett - Silver Burdett Mathematics (1973 edition)
AUTHORS:	Levels 1-6: LeBlanc, John F.; Vogeli, Bruce R.; Scott, Jessie L.; Grimsley, Edith E.; Barnhart, Tomkins E. Levels 7-8: LeBlanc, John F.; Vogeli, Bruce R.; Moredock, H. Stewart; Prevost, Fernand J.
PUBLISHER:	Silver Burdett Company
DATE:	1974 (Spanish, Levels 1-6) 1976 (Spanish, Levels 7-8) 1973 (English, Levels 1-8)
SOURCE NUMBERS:	30, 32
COST (PARTICULAR SOURCE):	Items too numerous to list
LANGUAGE:	Spanish (Translation/Adaptation by Francisco Garriga) English
PUBLISHER'S DESIGNATED GRADE LEVEL:	1 - 8
TYPE OF MATERIAL:	Basal mathematics textbook program
ANNOTATION:	This series of textbooks is an adaptation of the well-known Silver Burdett Mathematics program in English (1973 Edition). It is one of the very few comprehensive, basal mathematics textbook programs currently available in both English and Spanish in the U.S. Several levels are available in either hardcover or soft-cover editions. The pagination is the same for both the English and Spanish versions. The format is exceptionally clear, and the colorful illustrations and cartoons are identical to those in the English edition. Teacher editions are available in English, and teacher guides are available in Spanish (Guías Del Maestro) for each level. There are several other kinds of support material also available in English. Included in these support materials are tests, kits, films, games, skill-practice books, and lab cards.

A sincere effort is made throughout to develop problem-solving ability on the part of the students. The series is built around the following six major strands: sets, numbers and numeration, operations and properties; sentences and problem solving; geometry and measurement; probability, statistics, and graphing; and relations and functions.

MATERIALS NUMBER 20

TITLE:	Matemática para la Educación Primaria (Spanish adaptation of Elementary School Mathematics)
AUTHORS:	Eichol.., R.; Martin, E. (Consultants: Brumfiel, C.; Shanks, M.)
PUBLISHER:	Addison-Wesley Publishing Co., Inc.
DATE:	1968 (English) 1970 (Spanish)
SOURCE NUMBERS:	2, 16, 24
COST (PARTICULAR SOURCE):	Items too numerous to list
LANGUAGE:	Spanish English
PUBLISHER'S DESIGNATED GRADE LEVEL:	K - 6
TYPE OF MATERIAL:	Basal mathematics textbook program
ANNOTATION:	This set of seven paperbound books represents the Spanish adaptation of the well-known Addison-Wesley series Elementary School Mathematics (1968). The pagination for both editions is the same. Teacher guides (paperbound) are available in Spanish.

MATERIALS NUMBER 21

TITLE:	Matemáticas Alegres
AUTHORS:	Chilcote, Elinor; Blaine, Jeannie; Griego, Juan
PUBLISHER:	Scott Resources, Inc.
DATE:	1977
SOURCE NUMBER:	29
COST (PARTICULAR SOURCE):	$13.95 with binder $ 8.95 without binder (29)
LANGUAGE:	Spanish
PUBLISHER'S DESIGNATED GRADE LEVEL:	K - 2
TYPE OF MATERIAL:	Mathematics games and activities on reproducible blackline master worksheets
ANNOTATION:	This book is a Spanish adaptation of the well-known book Happy Math, also published by Scott Resources, Inc. The book is written entirely in Spanish, and contains a wealth of activities, worksheets, and games designed for grade levels K-2. However, some of the activities in the book would also be suitable for older children. The format consists of large, clear figures and illustrations. Included in the book are both group and independent mathematics activities. The objectives covered are stated in each section, and include basic mathematics skills, measurement, and enrichment topics.

MATERIALS NUMBER 22

TITLE:	Matemáticas Modernas para Escuelas Primarias. (Spanish adaptation of Modern School Mathematics: Structure and Use
AUTHORS:	Duncan, Ernest R.; Capps, Lelon R.; Dolciani, Mary P.; Quast, W. G.; Zweng, Marilyn
PUBLISHER:	Publicaciones Cultural, S. A., México/Houghton Mifflin
DATE:	1972
SOURCE NUMBERS:	13, 15, 16, 24
COST (PARTICULAR SOURCE):	Items too numerous to list
LANGUAGE:	Spanish English
PUBLISHER'S DESIGNATED GRADE LEVEL:	1 - 6
TYPE OF MATERIAL:	Basal mathematics textbook program
ANNOTATION:	This set of seven paperbound textbooks is the Spanish adaptation of the well-known series, Modern School Mathematics: Structure and Use, published by Houghton Mifflin Company in 1967. The pagination in both editions is the same. There are both student workbooks and teacher guides available for each level in Spanish.

MATERIALS NUMBER 23

TITLE:	Matemáticas Modernas Para Escuelas Secundarias (Libros 1,2)
AUTHORS:	Dolciani, Mary P.; Wooton, William; Beckenbach, Edwin F.; Chinn, William G.
PUBLISHER:	Publicaciones Cultural, S. A., México/Houghton Mifflin
DATE:	1968
SOURCE NUMBERS:	13, 15, 16, 24
COST (PARTICULAR SOURCE):	$8.50 each (16)
LANGUAGE:	Spanish English
PUBLISHER'S DESIGNATED GRADE LEVEL:	7 - 8
TYPE OF MATERIAL:	Basal mathematics textbook program
ANNOTATION:	These are Spanish adaptations of the well-known texts, Modern School Mathematics, Structure and Method, Courses 1,2, from Houghton Mifflin by the same authors. These were the first two books in the series of three for the junior high school level (grades 7-9); the third text for algebra was not translated. Programmed practice workbooks are available in Spanish. No teacher's edition is available in Spanish.

MATERIALS NUMBER 24

TITLE:	Matemáticas para Logro Individual-Libro de Trabajo (Levels 1-8)
AUTHORS:	Denholm, Richard A.; Hankins, Donald D.; Herrick, Marian C.; Votjko, George R.
PUBLISHER:	Houghton Mifflin Company
DATE:	1975
SOURCE NUMBER:	17
COST (PARTICULAR SOURCE):	Free
LANGUAGE:	Spanish English
PUBLISHER'S DESIGNATED GRADE LEVEL:	1 - 8
TYPE OF MATERIAL:	Workbook pages from each of the workbooks in the M.I.A. series
ANNOTATION:	This set of packets contains subsets of the pages from the original workbooks in English for the well-known program, Mathematics for Individual Achievement, published by Houghton Mifflin. The adaptation was done by Felix J. Curi and Gilbert García. Not all of the pages in any one workbook have been translated. These packets are available free to any teacher, school, or district after purchasing material from the Mathematics for Individual Achievement program in English.

MATERIALS NUMBER 25

TITLE:	Math-Art for the Classroom (1-6)
AUTHOR:	Campos, Judith
PUBLISHER:	Pan American Book Co.
DATE:	1976
SOURCE NUMBERS:	24, 28
COST (PARTICULAR SOURCE):	$5.95 (each book) or $33.00 (set of 6) (24)
LANGUAGE:	Bilingual-English/Spanish
PUBLISHER'S DESIGNATED GRADE LEVEL:	3 - 9
TYPE OF MATERIAL:	Shade-in puzzles
ANNOTATION:	This series of 6 paperbound books covers the following topics: whole numbers; fractions; decimals; measurement; percent, exponents, and integers; and mixed exercises. These books utilize a unique format in that the student works all the problems on each page, and then colors in the object which is already outlined for him or her. The problems are not directly related to the actual shading or coloring of the easily recognized object of multicultural historic or prehistoric art. All instructions are given in both English and Spanish.

MATERIALS NUMBER 26

TITLE:	Multicultural Math Shade-Ins (1-3)
AUTHOR:	Campos, Judith
PUBLISHER:	Pan American Book Co.
DATE:	1976
SOURCE NUMBERS:	24, 28
COST (PARTICULAR SOURCE):	$5.95 (Each book) or $16.00 (Set of 3) (24)
LANGUAGE:	Bilingual-English/Spanish
PUBLISHER'S DESIGNATED GRADE LEVEL:	3 - 9
TYPE OF MATERIAL:	Shade-in puzzles
ANNOTATION:	This set of 3 paperbound books cover skills involved in operations with whole numbers, multiples, divisibility rules, fractions, and decimals. The standard format for color-in/shade-in puzzles is used, in which the student colors or shades only those sections of a drawing which exhibit a special mathematical property. When properly finished, some easily recognizable, special figures or letters appear in the drawing. All instructions are in English and Spanish. It is possible, in some cases, to recognize the special figure before coloring or shading the puzzle. However, this does not detract from the usefulness of the material.

MATERIALS NUMBER 27

TITLE:	P.R.A.I.S.E. Program
AUTHOR:	Burrill, Jerry
PUBLISHER:	Jerry Burrill
DATE:	1978
SOURCE NUMBER:	25
COST (PARTICULAR SOURCE):	Items too numerous to list
LANGUAGE:	Spanish English
PUBLISHER'S DESIGNATED GRADE LEVEL:	6 - 12
TYPE OF MATERIAL:	Comprehensive competency-based mathematics program
ANNOTATION:	This program includes a built-in management system. Besides the workbooks for the mathematics work, there are an accompanying test kit and a complete set of cassette tapes. The first five workbooks on whole numbers, fractions, decimal fractions, percentages, and weights and measures (as well as their test kits) are available in Spanish. The last two workbooks are on algebraic topics; namely, directed numbers and equations/word problems. The author explains in the introduction that the letters P.R.A.I.S.E. symbolize proper placement, rapid reinforcement, arithmetic-algebra, individual itinerary, self-worth, and educational equipment.

MATERIALS NUMBER 28

TITLE:	Repaso Matemático
AUTHORS:	Stein, Edwin I. (Translator: Cox, Gloria Felix)
PUBLISHER:	Allyn and Bacon, Inc.
DATE:	1971
SOURCE NUMBERS:	3, 24
COST (PARTICULAR SOURCE):	$6.60 each/$1.35 Answer book (3)
LANGUAGE:	Bilingual-English/Spanish
PUBLISHER'S DESIGNATED GRADE LEVEL:	None designated
TYPE OF MATERIAL:	Paperbound textbook of traditional, basic mathematics skills with many student exercises
ANNOTATION:	This text contains Part I of Stein's book, Refresher Mathematics, and each page appears in both English and Spanish. It is a basic text in arithmetic set up to individualize assignments according to student needs. The exercises cover an extremely wide range of mathematics ability levels on the following major topics: whole numbers, common fractions, decimal fractions, percent, and squares/square roots. Included are diagnostic tests in each section, inventory tests, and achievement tests. Some contemporary topics are also included.

MATERIALS NUMBER 29

TITLE:	Spanish Purpose Puzzles (8 books)
AUTHOR:	Long, Roland
PUBLISHER:	National Textbook Company
DATE:	1975
SOURCE NUMBER:	22
COST (PARTICULAR SOURCE):	$9.00 each/$64.80 set of 8 (22)
LANGUAGE:	Spanish
PUBLISHER'S DESIGNATED GRADE LEVEL:	1 - 8
TYPE OF MATERIAL:	Spirit duplicating-master puzzle books
ANNOTATION:	This is a set of 8 paperbound puzzle books available only in spirit duplicating master form. These books are adaptations of the well-known Purpose Puzzles from National Textbook Company. The objectives covered in the series are listed on the front cover of each book. Included are widely ranging topics from basic operations to pre-algebra. The puzzles use a cross-number format. The worksheets are extremely uncrowded and very clear. There are about 30 puzzles in each book.

MATERIALS NUMBER 30

TITLE:	Tópicos de Matemáticas (8 books)
AUTHORS:	None indicated (Consultants for Spanish edition: Bendoyro, M. G.; Gutiérrez, H. R.; Tirado, E. N.; Savell, John F.; Wallace, George)
PUBLISHER:	Charles E. Merrill Publishing Co.
DATE:	1973
SOURCE NUMBER:	21
COST (PARTICULAR SOURCE):	$6.45 each book
LANGUAGE:	Spanish
PUBLISHER'S DESIGNATED GRADE LEVEL:	3 - 9
TYPE OF MATERIAL:	Spirit duplicating-master basic mathematics skills workbooks
ANNOTATION:	This set of 8 spirit duplicating-master books covers the following topics: base ten numeration system; addition, subtraction, multiplication, and division of whole numbers; understanding of common fractions; operations with decimals. Each book contains 24 workbook-type pages on basic mathematical concepts and operations. The format is clear. This series is available in English from Merrill as Nongraded Mathematics Topic-texts.

APPENDIX I

SOURCES

of Bilingual Materials for Mathematics

1. ACTIVITY RESOURCES COMPANY, INC.
   20655 Hathaway Avenue
   P.O. Box 4875-L
   Hayward CA 94540
   (415) 782-1300

2. ADDISON-WESLEY PUBLISHING CO., INC.
   School Division National Hqs.
   2725 Sand Hill Road
   Menlo Park CA 94025
   (415) 854-0300

3. ALLYN AND BACON, INC.
   470 Atlantic Avenue
   Boston MA 02210

   Western Region
   Ralston Park
   Belmont CA 94002
   (415) 591-4491

4. BABEL/BASTA
   Bay Area Bilingual Education League/Bilingual Alternatives for Secondary Teachers and Aides
   1414 Walnut Street
   Berkeley CA 94709
   (415) 644-6154

5. BECKLEY-CARDY
   Regional Office and Distribution Center
   25803 Clawiter Road
   Hayward CA 94545
   (415) 783-2622

   Southern California Sales Office and Teacher's Store
   3145 South Hoover Street
   Los Angeles CA 90007
   (213) 747-0336

6. BILINGUAL-BICULTURAL EDUCATION PROGRAM, ESEA Title VII
   California State University, Fullerton
   800 No. State College Boulevard
   Fullerton CA 92634
   (714) 870-3994

7. BILINGUAL EDUCATIONAL SERVICES, INC.
   P.O. Box 669
   1603 Hope Street
   South Pasadena CA 91030
   (213) 682-3456

8. BILINGUAL EDUCATION SERVICE CENTER
   500 So. Dwyer Street
   Arlington Heights IL 60005
   (312) 255-9820

   ATTN: Elizabeth Hernández, Librarian

9. CALIFORNIA STATE DEPARTMENT OF EDUCATION
   P.O. Box 271
   Sacramento CA 95802

   ASK FOR SELECTED PUBLICATIONS OF THE CALIFORNIA STATE DEPARTMENT OF EDUCATION.

10. CREATIVE PUBLICATIONS
    3977 East Bayshore Road
    P.O. Box 10328
    Palo Alto CA 94303
    (415) 968-3977

11. CURRICULUM DEVELOPMENT / SOCIATES, INC.
    1211 Connecticut Avenue, N.W.
    Suite 414
    Washington DC 20036
    (202) 293-1760

    266 Grand Avenue-Suite 280
    Oakland CA 94610
    (415) 834-8170

12. DISSEMINATION AND ASSESSMENT CENTER FOR BILINGUAL EDUCATION
7703 North Lamar Boulevard
Austin TX 78752
(512) 458-9131

13. EDITORIAL EXCELSIOR CORP.
Two North First Street
San José CA 95113
(408) 293-3734

14. EPIE INSTITUTE
637 West 125th Street
New York NY 10014
(212) 866-3600

15. EUROPEAN BOOK COMPANY
925 Larkin Street
San Francisco CA 94109
(415) 474-0626

16. HEFFERNAN SCHOOL SUPPLY COMPANY, INC.
2111 West Avenue
San Antonio TX 78201
(512) 732-1136

17. HOUGHTON MIFFLIN COMPANY
777 California Avenue
Palo Alto CA 94304
(415) 324-4777

18. KEY CURRICULUM PROJECT
P.O. Box 2304
Berkeley CA 94702

19. LOS ANGELES UNIFIED SCHOOL DISTRICT
450 North Grand Avenue, Room A-319
Los Angeles CA 90012
(213) 625-6417

ATTN: Robert Hamada,
Mathematics Specialist

20. MATHEMATICS ACHIEVEMENT SYSTEM (MAS)
P.O. Box D.C.
Rosemead CA 91770
(213) 448-8530

ATTN: Carol Schroeder

21. CHARLES E. MERRILL PUBLISHING CO.
1300 Alum Creek Drive
Columbus OH 43216

Manager, Western Region
Robert L. Dees
504 South Arden Street
Anaheim CA 92802
(714) 635-5549

22. NATIONAL TEXTBOOK COMPANY
8259 Niles Center Road
Skokie IL 60077
(800) 323-4900

23. PACOIMA JUNIOR HIGH SCHOOL
Mathematics Demonstration Center
9919 Laurel Canyon Boulevard
Pacoima CA 91331
(213) 896-5816

ATTN: Elaine Lindsay

24. PAN AMERICAN BOOK COMPANY
4362 Melrose Avenue
Los Angeles CA 90029
(213) 665-8000

25. P.R.A.I.S.E. MATH PROGRAM
27855 Sand Canyon Road
Canyon Country CA 91351
(805) 252-8596

ATTN: Jerry Burrill

26. PRENTICE-HALL LEARNING SYSTEMS, INC.
P.O. Box 47X
Englewood Cliffs NJ 07632

27. RAND McNALLY AND COMPANY
School Department
P.O. Box 7600
Chicago IL 60680

27. RAY ACTION CO.
10546 Burbank Blvd., Suite 4
North Hollywood CA 91601

29. SCOTT RESOURCES, INC.
1900 E. Lincoln
P.O. Box 2121 CN
Fort Collins CO 80522
(303) 484-7445

30. SILVER BURDETT COMPANY
250 James Street
Morristown NJ 07960

Western Regional Office
2450 Embarcadero Way
Palo Alto CA 94303
(415) 327-4081

31. SPANISH BOOK CORPORATION OF AMERICA
(Division of French and European Publications, Inc.)
652 South Olive Street
Los Angeles CA 90014
(213) 489-7963

32. VROMAN'S SCHOOL BOOK DEPOSITORY
2085 E. Foothill
Pasadena CA 91109
(213) 449-5320

APPENDIX II

SELECTED REFERENCES ON BILINGUAL MATERIALS

Title: BIBLIOGRAPHY OF SPANISH MATERIALS FOR STUDENTS GRADES SEVEN THROUGH TWELVE

Author: By Committee
Publisher: California State Department of Education (9)
Date of Publication: 1972
Language: English
Designated Grade Level: 7-12
Type of Material: Teacher Resource Material - List of materials suitable for use in several subject areas at the secondary level

Title: BILINGUAL EDUCATION RESOURCE GUIDE

Author: By Committee
Publisher: National Education Association
Date of Publication: 1977
Language: English
Designated Grade Level: None indicated
Type of Material: Descriptions and listings of resources for a bilingual education program, including information on state programs, resources centers, and teacher education programs.

Title: BILINGUAL MATHEMATICS - ELEMENTARY AND SECONDARY: AN ANNOTATED BIBLIOGRAPHY

Author: Sánchez, Andrés D.
Publisher: BABEL (4)
Date of Publication: Unknown
Language: English
Designated Grade Level: K-12
Type of Material: Teacher Resource Material - Bibliography

Title: CURRICULUM MATERIALS FOR BILINGUAL PROGRAMS, SPANISH-ENGLISH, PRE-K - 12

Author: Compiled by Helen Alvarado
Publisher: Bilingual Education Service Center (8)
Date of Publication: 1973
Language: English
Designated Grade Level: Pre-K to 12

(Supplement for Pre-K through Adult published in 1974.)

Title: DICCIONARIO DE TERMINOS MATEMATICOS - DICTIONARY OF MATHEMATICAL TERMS

Author: Martínez, Lauro
Publisher: ESEA Title VII - Bilingual Bicultural Education Program, California State University, Fullerton (6)
Date of Publication: 1973
Language: Spanish/English and English/Spanish
Designated Grade Level: None indicated
Type of Material: Dictionary (Mathematics Terminology) Teacher/Student Resource Materials

Title: EPIE REPORT: NUMBERS 73, 74 SELECTOR'S GUIDE FOR BILINGUAL EDUCATION MATERIALS/#73 - VOLUME 1 - SPANISH LANGUAGE ARTS; #74 - VOLUME 2 - SPANISH "BRANCH" PROGRAMS

Author: By Committee
Publisher: EPIE INSTITUTE (Educational Products Information Exchange) (14)
Date of Publication: 1976
Language: English
Designated Grade Level: K-12
Type of Material: Teacher Resource Material

APPENDIX III

LIST OF SELECTED MATHEMATICAL TERMS AND EXPRESSIONS

(Spanish/English)

Compiled by

C. James Lovett

The following collection is a minimal list of terms and expressions useful in the teaching of mathematics at the elementary school level. The collection is organized by general topic; within each section, terms and expressions are generally grouped by their relationships rather than listed alphabetically.

Cardinal Numbers

Números cardinales	cardinal numbers
uno	one
dos	two
tres	three
cuatro	four
cinco	five
seis	six
siete	seven
ocho	eight
nueve	nine
diez	ten
once	eleven
doce	twelve
trece	thirteen
catorce	fourteen
quince	fifteen
dieciseis	sixteen
diecisiete	seventeen
dieciocho	eighteen
diecinueve	nineteen
veinte	twenty
veintiuno	twenty-one
veintidos	twenty-two
treinta	thirty
treinta y uno	thirty-one
treinta y dos	thirty-two
cuarenta	forty
cincuenta	fifty
sesenta	sixty
setenta	seventy
ochenta	eighty
noventa	ninety
ciento	one hundred
ciento y uno	one hundred one
doscientos	two hundred
trescientos	three hundred
cuatrocientos	four hundred
quinientos	five hundred
seiscientos	six hundred
setecientos	seven hundred
ochocientos	eight hundred
novecientos	nine hundred
mil	one thousand
cien mil	hundred thousand
un millón	one million

Ordinal Numbers

Números ordinales	ordinal numbers
primero	first
segundo	second
tercero	third
cuarto	fourth
quinto	fifth
sexto	sixth
séptimo	seventh
octavo	eighth
noveno	ninth
décimo	tenth

Fractions

Fracción; quebrado	fraction
Fracción común	common fraction
Fracción propia	proper fraction
Fracción impropia	improper fraction
Fracciones equivalentes	equivalent fractions
Numerador	numerator
Denominador	denominator
Mínimo común denominador	least common denominator
un medio	one-half
un tercio	one-third
un cuarto	one-fourth
tres cuartos	three-fourths
un quinto	one-fifth
un sexto	one-sixth
un octavo	one-eighth
un decimo	one-tenth

Types of Numbers

Número natural	natural number
Número entero; entero	integer
Número racional	rational number
Divisor	divisor
Divisor común; factor común	common divisor; common factor
Máximo cómun divisor	greatest common divisor
Múltiplo	multiple
Múltiplo común	common multiple
Mínimo común múltiplo	least common multiple
Número par	even number
Número impar	odd number
Número primo	prime number
Número compuesto	composite number

Relations

Igual	equal
Desigual	not equal
Igualdad	equality
Desigualdad	inequality
Mayor que	greater than
Menor que	less than
Cinco es más grande que dos.	Five is larger than two.
Cinco es mayor que dos.	Five is greater than two.
Dos es más pequeño que cinco.	Two is smaller than two.
Dos es menor que cinco.	Two is less than five.
Cinco es igual que 3+2.	Five is equal to 3+2.
¿Qué número está entre 5 y 7?	What number is between 5 and 7?
¿Qué número viene después de 7?	What number comes after 7?
¿Qué número viene antes de 7?	What number comes before 7?

Place Value

Millones	millions
Centenas de mil	hundred thousands
Decenas de mil	ten thousands
Miles	thousands
Centenas	hundreds
Decenas	tens
Unidades	units
Décimos	tenths
Centésimos	hundredths
Milésimos	thousandths
Diezmilésimos	ten-thousandths

¿Cual es el valor de 5 en el número siguiente?
What is the value of the 5 in the following number?

Operations

Suma; adición	addition
Sumar	to add
Sumando	addend
Resultado; suma; total	sum
¿Cuánto es 5 más 2?	How much is 5 plus 2?
Cinco más dos son siete.	Five plus two is seven.
Resta; substracción	subtraction
Restar	to subtract
Minuendo	minuend
Subtraendo	subtrahend
Diferencia; resultado	difference
¿Cuánto es 7 menos 5?	How much is 7 minus 5?
Siete Menos cinco son dos.	Seven minus five is two.
Multiplicación	multiplication
Multiplicar	to multiply
Multiplicando; factor	multiplicand; factor
Multiplicador; factor	multiplier; factor
Producto; resultado	product
¿Cuánto es 5 por 2?	How much is 5 times 2?
Cinco por dos son diez.	Five times two is ten.
División	division
Dividir	to divide
Divisor	divisor
Dividendo	dividend
Cociente	quotient
Residuo	remainder
¿Cuánto es diez dividido dos?	How much is ten divided by two?
Diez dividido dos son cinco.	Ten divided by two is five.

Measurement and Metric Units

Unidad	unit of measure
Longitud	length
Metro	meter
Decímetro	decimeter
Centímetro	centimeter
Milímetro	millimeter
Decámetro	decameter
Hectómetro	hectometer
Kilómetro	kilometer
Área	area
Metro cuadrado	square meter
Centímetro cuadrado	square centimeter
Hectárea = hectómetro cuadrado	hectare = square hectometer
Volumen	volume
Metro cúbico	cubic meter
Centímetro cúbico	cubic centimeter
Litro	liter
Mililitro	milliliter
Peso	weight
Gramo	gram
Miligramo	milligram
Kilogramo	kilogram

Geometry

Polígono	polygon
Triángulo	triangle
Triángulo equilatero	equilateral triangle
Triángulo isósceles	isosceles triangle
Triángulos semejantes	similar triangles
Triángulos congruentes	congruent triangles
Cuadrilátero	Quadrilateral
Paralelogramo	parallelogram
Rectángulo	rectangle
Cuadrado	square
Pentágono	pentagon
Hexágono	hexagon
Perímetro	perimeter
Línea	line
Líneas paralelas	parallel lines
Punto	point
Diagonal	diagonal
Ángulo	angle
Ángulo agudo	acute angle
Ángulo obtuso	obtuse angle
Ángulo recto	right angle
Ángulos congruentes	congruent angles
Grado	degree
Círculo	circle
Centro	center

Diámetro	diameter
Radio	radius
Cuerda	chord
Circunferencia	circumference

Sets

Conjunto	set
Elemento	element
Subconjunto	subset
Reunión de dos conjuntos	union of two sets
Intersección de dos conjuntos	intersection of two sets
Conjuntos disjuntos; conjuntos ajenos	disjoint sets
Conjunto vacío; conjunto nulo	empty set